transformations, nearly all problems in dynamics (except those relating to impact) may be solved. The sign = is to be considered as meaning only "is numerically equivalent to," and never as meaning "is," as in the inaccurate statement "force is the time rate of momentum."

The main ideas in the above syllabus are:

1. That words should be used as far as possible in their most common meaning; thus, "weight," and not "mass," is the word that means, in ordinary language, the quantity of matter expressed in pounds.

2. That the English system of weights and measures is used until the subject has been carried as far as this syllabus extends. The metric system can now be used with the same equations, and the C.G.S. system with its "dimensions" postponed to the end of the course.

3. An attempt has been made to use no more technical terms and definitions than are absolutely necessary. The poundal and the gee-pound are ignored and the dyne and the erg postponed.

4. Force is treated as an entity, capable of being measured directly as matter and space are, and not as a mere mathematical function derived from length, mass and time.

5. The word "mass," which gives most difficulty to younger students, is postponed till near the end of the syllabus, and is then introduced merely as a convenient substitute for W/g. The word weight is explained to mean quantity of matter as determined by weighing it on an even balance scale (not on a spring balance). When W is so weighed, the London value of g is always used in finding $M = W/g$.

6. In teaching a class, after the preliminary study of the derivation of the equations is finished, I would put them on the blackboard and let them remain there for handy reference when solving problems. A great number of problems should be solved by the class.

I am aware that much of what I have written above will be considered rank heresy by many teachers of physics, but I submit that since in the past they have failed to teach dynamics in such a manner that the students can grasp the subject and use it in college, it is high time they changed their methods and try the method that was successfully used fifty years ago.

Wm. Kent

INFLUENCE OF OXYGEN ON THE VALUE OF COAL

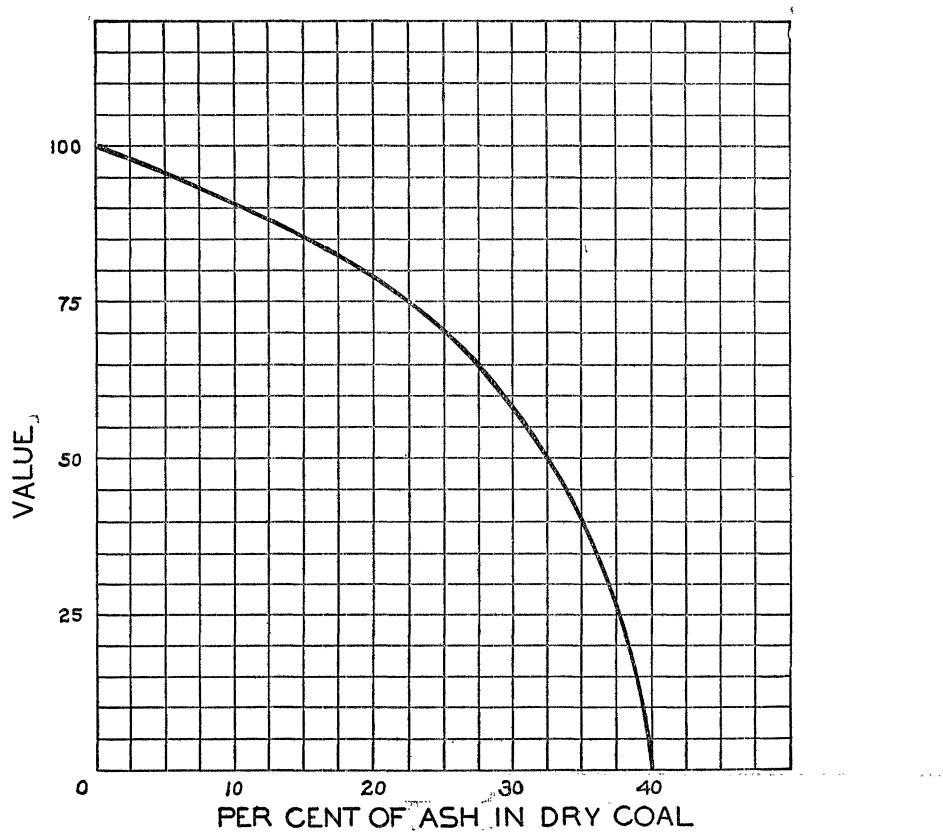
To the Editor of Science: Dr. David White, in Bulletin No. 382 of the United States Geological Survey, under the title of "Oxygen in Coal," has presented some interesting and valuable matter. There are certain features, however, which may profitably have more exact examinations.

Dr. White shows that the presence of oxygen in coal has an effect equal to that of ash in reducing the heating power value of the fuel; it is, of course, true that it displaces an amount of combustible matter equal to that of ash. There is some question, however, as to what is implied by the statement. As far as the combustion process is concerned, oxygen is present as a gas and aside from displacing a corresponding weight of combustible matter in the coal, its only harmful influence is in carrying away a small amount of heat in its exit to the chimney; while the presence of ash, on the other hand, has a very harmful influence on the result produced in combustion, because ash makes clinker and otherwise obstructs the fire.

W. L. Abbott[1] has shown in a well-conducted series of experiments that the value of fuel, for the purpose of making steam, drops to zero when the ash content is equal to 40 per cent., as shown by the accompanying diagram. Therefore, it appears that ash is enormously more harmful than oxygen, because if the latter was present to the extent of 40 per cent. the loss of heat from this cause would not exceed 6 or 7 per cent.

While particular emphasis has been placed upon the presence of oxygen as an element by Dr. White, I would prefer considering the matter from the standpoint of the total inert volatile matter instead of simply that of oxygen

[1] *Journal of the Western Society of Engineers*, Vol. XI., p. 529.



alone. The argument may be made clear by the two following tables:

ELEMENTS IN COAL

Combustible	*Non-combustible*
Carbon.	Oxygen.
Hydrogen.	Nitrogen.
Sulphur.	

COMPOSITION OF COAL

Combustible	*Non-combustible*
Carbon.	Water of combination.
Available hydrogen.	Nitrogen.
Sulphur.	

The first table presents a list of elements in coal and by this pure coal is meant, or, in other words, free from ash and moisture. In the second tabulation it will be observed that no oxygen is listed, but a new constituent water of combination takes its place. Our conception of the presence of oxygen in coal is that it is all in combination with hydrogen. The table also shows hydrogen which is available in combustion for heat production. Thus, when values are given upon this basis, the inert volatile matter which contains oxygen and hydrogen as water of combination, becomes a larger quantity than the oxygen figure which Dr. White has employed.

A. BEMENT

2114 FISHER BUILDING,
CHICAGO, ILL.

ALLIGATOR MISSISSIPPIENSIS IN OKLAHOMA

THE occurrence of any species of reptile at a considerable distance beyond its usual or recorded range is a matter of general zoological interest. The capture of *Alligator mississippiensis* Daudin in central Oklahoma under circumstances which render it very improbable that the individual had ever been in captivity seems, therefore, worthy of record. The specimen was taken in a "lake" or bayou of the South Canadian River within five miles of the State University of Oklahoma, at Nor-